

Appl. Serial No. 10/849,752
Amendment Dated August 7, 2007
Reply to Office Action Mailed May 7, 2007

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AMENDMENTS TO THE CLAIMS

This listing of claims replaces all prior versions, and listings, of claims in the application:

1. - 2. (Cancelled)

3. (Currently Amended) A storage device comprising:

a storage medium having a plurality of storage cells; [[and]]

a probe to read from and write to the storage cells,

wherein the storage medium includes a first structure and second structure,

wherein a first storage cell containing a transition between the first structure and the second structure contains a data bit having a first state, [[and]]

wherein a second storage cell including the first structure but not including a transition between the first structure and the second structure contains a data bit having a second state, and

wherein a third storage cell including the second structure but not including a transition between the first structure and the second structure contains a data bit having the second state.

4. (Original) The storage device of claim 3, wherein the first structure comprises a trench, and the second structure comprises a surface of the storage medium.

5. (Previously Presented) The storage device of claim 3, wherein the first structure has a different physical characteristic than the second structure.

6. (Previously Presented) The storage device of claim 3, wherein the first structure has a different chemical characteristic than the second structure.

7. (Previously Presented) The storage device of claim 3, wherein the first structure has a different electronic characteristic than the second structure.

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1 8. (Previously Presented) The storage device of claim 3, wherein the probe
2 comprises a nanotechnology probe.

1 9. (Currently Amended) A system comprising:
2 a processor; and
3 a storage device coupled to the processor, the storage device comprising:
4 a probe;
5 a storage medium having a storage surface, the probe to form a trench in the
6 storage medium, wherein a transition between the trench and the storage surface represents a first
7 storage state, and wherein lack of a transition between the trench and the storage surface
8 represents a second different storage state, wherein the storage medium includes storage cells
9 including:
10 a first storage cell located in a first region containing a first end of the
11 trench;
12 a second storage cell located in a second region containing a second end of
13 the trench, each of the first and second ends constituting a transition;
14 a third storage cell located in a third region containing a portion of the
15 trench without presence of the storage surface; and
16 a fourth storage cell located in a fourth region containing a portion of the
17 storage surface of the storage medium away from the trench,
18 wherein each of the first and second storage cells stores a respective data
19 bit having the first storage state, and each of the third and fourth storage cells stores a respective
20 data bit having the second storage state.

1 10. – 12. (Cancelled)

1 13. (Original) The system of claim 9, further comprising read circuitry to detect
2 engagement of the probe with a transition between the trench and the storage surface.

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1 14. (Original) The system of claim 13, wherein the probe has a tip, the probe tip and
2 the storage medium moveable with respect to each other to enable the probe tip to engage the
3 storage surface, the trench, and any transition between the trench and the storage surface.

1 15. (Original) The system of claim 14, wherein the probe tip is adapted to form the
2 trench during a write operation.

1 16. (Original) The system of claim 15, wherein the probe tip is adapted to form a
2 second trench in the storage medium during the write operation, a transition between the second
3 trench and the storage surface to represent the first storage state.

1 17. (Currently Amended) The system of claim ~~16~~ 9, further comprising:
2 an encoder to encode input data to produce encoded data to reduce a number of
3 transitions between the first and second storage states in a sequence of storage cells; and
4 write circuitry to cause the probe to write the encoded data to the storage medium
5 by forming at least the trenches in the storage medium.

1 18. (Original) The system of claim 17, wherein the encoding performed by the
2 encoder causes each of the trenches to have greater than a predetermined length.

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1 19. (Currently Amended) A method of storing data in a storage device, comprising:
2 forming, with a probe, a first structure in a storage medium, the storage medium
3 further comprising a second structure;
4 indicating a first data state in response to detecting a transition between the first
5 structure and the second structure in a first storage cell; and
6 indicating a second data state in response to detecting lack of transition between
7 the first structure and the second structure in a second storage cell, wherein the second storage
8 cell contains the first structure but not the second structure; and
9 indicating the second data state in response to detecting lack of transition between
10 the first structure and the second structure in a third storage cell, wherein the third storage cell
11 contains the second structure but not the first structure.

1 20. (Original) The method of claim 19, wherein the first structure comprises a trench,
2 and the second structure comprises a surface of the storage medium,
3 wherein forming the trench comprises heating a temperature of a tip of the probe
4 to greater than a write temperature to cause a portion of the storage medium to melt.

1 21. (Original) The method of claim 20, wherein detecting a transition comprises
2 detecting a transition between the trench and the surface of the storage medium.

1 22. (Original) The method of claim 20, further comprising:
2 receiving input write data;
3 encoding the input write data to produce encoded write data; and
4 writing the encoded write data to storage cells of the storage medium instead of
5 the input write data,
6 wherein writing the encoded write data to the storage cells comprises writing
7 variable length trenches in the storage medium.

1 23. - 24. (Cancelled)

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1 25. (New) The storage device of claim 3, further comprising:

2 a read circuit to produce a first indication in response to the probe being engaged
3 with the first structure, and to produce a second indication in response to the probe being
4 engaged with the second structure, the read circuit to:

5 indicate that the first storage cell has the first state in response to detecting
6 a change from the first indication to the second indication,

7 indicate that the second storage cell has the second state in response to
8 detecting the first indication associated with the second storage cell without detecting the second
9 indication associated with the second storage cell, and

10 indicate that the third storage cell has the second state in response to
11 detecting the second indication associated with the third storage cell without detecting the first
12 indication associated with the third storage cell.

1 26. (New) The storage device of claim 25, wherein the read circuit comprises:

2 a sensing device coupled to the probe,

3 the sensing device to produce the first and second indications, and

4 a decoder to receive the first and second indications from the sensing device to
5 provide outputs indicating states of storage cells.

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27. (New) The system of claim 9, wherein the storage device further comprises:

a read circuit to produce a first indication in response to the probe being engaged with the trench, and to produce a second indication in response to the probe being engaged with the storage surface away from the trench, the read circuit to:

indicate that the first and second storage cells store respective data bits having the first storage state in response to detecting a change between the first indication and the second indication,

indicate that the third storage cell has the second storage state in response to detecting the first indication associated with the third storage cell without detecting the second indication associated with the third storage cell, and

indicate that the fourth storage cell has the second storage state in response to detecting the second indication associated with the fourth storage cell without detecting the first indication associated with the fourth storage cell.